PS 390 SITE PREPARATION AND CUSTOMER SUPPORT GUIDE

EVANS & SUTHERLAND

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PREFACE

This guide lists the steps that you, as the customer, must take prior to requesting the installation of an Evans & Sutherland PS 390 Graphics System. This guide also describes the installation process and lists the services that are provided by Evans & Sutherland after the installation is complete. E&S hardware installation information given in this manual is for reference only and should not become the basis for unauthorized installation.

Please read this guide carefully. It supports the PS 390 Graphics System and refers you to the appropriate customer installation manual for your host/PS 390 interface.

The first page of this guide is the Customer Installation Checklist. You must complete this checklist before requesting the hardware installation of your system. All the installation requirements for your interface and any options must be met before requesting the installation of your system. If you have any questions regarding installation procedures or requirements, please call E&S Customer Service Center at (800) 582-4375.

Chapter 1 provides a comprehensive list of site preparation requirements. This chapter provides the site planning and preparation procedures that must be completed before your system can be installed.

Chapter 2 briefly describes the installation process that is concluded by completing the Performance Verification Test. This test must be run in the presence of an authorized customer representative. Information is provided on E&S 60-day warranty on new products that is initiated by the completion of the Performance Verification Form.

Chapter 3 describes the maintenance services that are available through the Customer Engineering Department.

Chapter 4 contains PS 390 system operating considerations and a brief troubleshooting guide.

RELATED DOCUMENTS

This guide refers to other documentation provided with PS 390 systems. For site preparation purposes, all installation manuals for interfaces and options purchased with the PS 390 system are shipped with the system software and should arrive at your site approximately two to three weeks prior to the system hardware.

Please open the system software package and read the installation manuals as soon as they arrive.

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CUSTOMER INSTALLATION CHECKLIST

PS 390 GRAPHICS SYSTEMS

Before requesting hardware installation and testing of the PS 390 Graphics System, you, as the customer, must meet the requirements for system installation. You have met the requirements when you can answer yes to the questions listed below. Do not request hardware installation until this list is complete.

1. Has the software package arrived at your site? This package contains floppy diskettes, magnetic tape, and important documentation that must be read before installation can take place.

2. Has the hardware arrived at your site? The PS 390 system is usually shipped in three large boxes that should not be opened or unpacked. The documentation is shipped in one small box that should be opened.

3. Do you have a location readied for the system that meets all space, environmental, and ease-of-access considerations?

4. Does your site meet the power requirements of the PS 390 system?

5. Do you have a table or a suitable surface for the PS 390 display? Is it close enough so the video cable will reach the logic cabinet?

6. Do you have a functional host system that is ready to communicate with the PS 390?

7. Have you read the appropriate **Customer Installation and User Manual** for your interface and met all the requirements listed on the Customer Installation Checklist for that interface, including loading the E&S host-resident software on your host and purchasing and running the appropriate interface cable from your host to the location of the PS 390?

8. Have you moved the shipping crates from your dock to the installation area?

9. Have you made sure that a system manager or someone with system privileges, as well as an authorized customer representative will be available during the hardware installation process?

If you have answered yes to all questions, call the E&S Customer Service Center at 1-800-582-4375 and request installation.

1. INSTALLATION REQUIREMENTS

Read this chapter carefully before beginning any site preparation procedures. You must meet site requirements before an Evans & Sutherland Customer Engineer can install the hardware for the PS 390 system.

If there are any questions regarding installation procedures or requirements, please call E&S Customer Service Center, 1-800-582-4375.

As it is impossible to predict the needs of each particular installation, the information presented here is general in nature and should be tailored to meet your own needs. These site planning guidelines promote:

- Timely system installation.
- Optimum equipment reliability.
- Efficient operation of the system.
- Ease of equipment maintenance.

You must meet the following four requirements before an E&S field representative can perform the actual system installation.

1. Selection and preparation of your site, including adequate space and location, provisions for power, temperature and air quality, and sufficient facilities preparation for the PS 390 system and interactive devices. This guide provides you with the information necessary to make a site selection and preparation.

2. Verification that your host system can communicate with the PS 390 and supports the protocol that will be used in host/PS 390 data transfer. It is up to you to make sure your host is functional.

3. Installation of cabling to connect the PS 390 with the host system; this cabling must meet specified standards and have the proper connector.

4. Loading of the E&S host-resident software on your host system so that communication testing between the host and the PS 390 system can be performed as part of the installation procedure.

The checklist on the previous page is provided to ensure that you observe important steps in site selection and planning. The list is a simple cross-check to determine if the primary site requirements have been met before installation is requested.

PREDELIVERY PLANNING

Predelivery planning is essential for smooth installation and acceptance of a computer graphics system. It is important that you prepare a detailed schedule of installation activity as soon as possible after the equipment has been ordered and the site selected and prepared.

Once the installation has taken place, you are responsible for the disposal of the packing material. Preparations should be made in advance to remove the empty packaging material from the installation site when installation is complete.

Delivery Constraints

The largest box fits through a standard 3 1/2 foot doorway. Ensure the route the equipment is to travel from the receiving area to the installation site allows the equipment to move freely. The packaged equipment must be able to fit through any halls, doorways, around any bends, or in elevators.

Equipment Packaging and Handling

CAUTION

Do not subject the equipment boxes to any hard bumps or shocks. Keep the boxes in a vertical position as indicated on the box surface.

It is your responsibility to transport the system from its unloading site to the actual installation site. This should be done prior to the system installation date.

For shipment, the PS 390 system is packed in reinforced cardboard boxes. The dimensions of the shipping boxes are shown in Table 1-1.

Table 1-1. PS 390 Packaged Dimensions

	Height (inches)	Width (inches)	Depth (inches)	Weight (lbs)
Control Unit	30.0	28.5	28.0	125
Display	23.0	28.5	24.0	95
Peripheral Multiplexer & peripherals	17.0	29.0	29.0	45

All E&S equipment, with the exception of boxes containing host software and documentation, are marked with the following warning:

WARNING

> To be opened and unpacked only by Evans & Sutherland Field Service Representatives. Unpacking by unauthorized persons may void the warranty on this equipment.

If you must open the boxes to move the system to the installation site, please contact the E&S Customer Service Center and request authorization to open the boxes.

Should you unpack or inspect any of the equipment without an E&S representative present, or without authorization from E&S, you assume all responsibility for any damage or shortage claims with the carrier.

SITE PLANNING

Adequate site planning and preparation eases the installation process and produces efficient system operation. Site planning requirements vary greatly from site to site. The location and environmental aspects of your system are as significant as the equipment itself. The system could prove to be unusable if it is placed in an awkward or inadequately supported location. Space and location are the primary considerations for site selection.

The PS 390 components and size specifications are shown in Table 1-2.

Table 1-2. PS 390 System Components

	Height (inches)	Width (inches)	Depth (inches)	Weight (lbs)
Control Unit	26.5	21.0	28.0	120
Display	21.25	19.5	22.0	90
Peripheral Multiplexer	3.0	15.0	16.5	10
*Keyboard	3.5	21.1	8.3	8.2
Dials	9.0	5.5	8.0	10
12x12 Tablet	3.0	15.7	16.4	11
6x6 Tablet	1.0	12.0	9.0	3
Function Buttons	10.0	6.75	10.0	5
Control unit weight includes 5 basic cards.				

Cable Lengths

	Length (feet)
Display to Logic Cabinet	15
Peripheral Multiplexer to Logic Cabinet	15
Logic Cabinet to AC Power	8
Peripheral Multiplexer to AC Power	8
Display to Peripheral Multiplexer	3

*This is the size of the largest keyboard available, other keyboards are slightly smaller.

NOTE

The display to logic cabinet, and the peripheral multiplexer to logic cabinet cables can also be ordered in 25, 50, and 100 foot lengths.

Space

The control unit uses approximately 4 square feet of floor space. The display and all peripherals use approximately 4 square feet of desk space. The Peripheral Multiplexer is designed to sit underneath the display. The system should be at least 12 feet from all sources of heat, including sunlight and central heating vents, with a minimum of 2 inches of clearance around the control unit to allow for air flow and cabling. At least two sides of the control unit must be left exposed to allow for adequate air flow. The back of the display must have at least 6 inches of clearance for cabling.

The actual floor area required for the system will depend on the system itself, the length-to-width ratio of the area, and the locations of walls, partitions, windows, and doors. To determine the exact area your system requires, prepare a scaled layout that includes all features of the site location. The area allotted should provide for:

- Future expansion of the system.
- Storage of related materials.
- Convenient system operation.
- Easy access for service and maintenance.

Location

Locate your system site near work-related areas for efficient operation. The distance from the host to the PS 390 is determined by the type of interface used. Refer to the appropriate customer installation manual for your interface for information on distance limitations or restrictions.

The location of the site also depends on existing or planned facilities at the site. The location must:

- Provide adequate AC power.
- Conform to environmental requirements.
- Provide adequate flooring.
- Conform to safety and fire regulations.
- Provide easy access for equipment delivery and installation.
- Provide for the flow of work in the most efficient manner possible with respect to such considerations as related areas, human factors, storage, and noise isolation.

ENVIRONMENTAL SUPPORT

You must plan for adequate power and environmental support factors such as, temperature requirements and adequate air quality when selecting your system site.

Power Requirements

The typically configured PS 390 system requires one 15 - 20 AMP service. This provides enough power to serve a PS 390 configured with 9 cards. However, you will need to provide additional power for any other equipment that will be operated in the area such as test equipment, calculators, and so forth. The wall receptacles should be standard wall plugs, NEMA 5-15R 125V 15A or equivalent. The power specifications for the components are shown in Table 1-3.

A 220 power option is available.

Table 1-3. PS 390 System Components Power Specifications

	Line Voltage (VAC)		Maximum Current (AMPS)		Line Frequency	Phase Load	Power Consumption
	110V	220V	110V	220V	(Hz)		(watts)
Control Unit	110 ±10%	220 ±10%	12	6	47-63	Single	1380 (max)
Color Raster Display	115 ±10%	220 ±10%	1.5	.65	50-60	Single	150 nominal (includes mux&display)
Peripheral Multi-plexer	90-130	220 ±10%	0.6	0.3	47-63	Single	250 nominal

NOTE

The control unit and displays run on two-wire-plus-ground circuits. Each display must share a common ground with its supporting control unit. If a Terabit parallel interface without DR300X option is to be installed, a separate ground from the host must be provided.

The available supply of AC power must be adequate to handle the power loads represented by the installation of the PS 390 as well as any anticipated future loads. The electrical system must conform to applicable national and local codes and ordinances. Check the electrical service prior to system installation to ensure that power levels are within the specified limits.

To ensure proper operation of the PS 390 system, the following limitations are placed on AC power disturbances:

- A maximum of ± 10% of nominal power for .1 seconds occurring no more than once every 10 seconds.
- Maximum harmonic content of 5% rms, no more than 3% rms for any single harmonic.
- Maximum impulse of 300V with rise time of .1 microseconds or slower, lasting no longer than 10 microseconds for total duration.

CAUTION

Many unconditioned AC service mains exceed these specifications, especially during periods of heavy use and/or electrical disturbances. Ensure that the input power supplied to PS 390 equipment has been adequately conditioned.

Temperature Requirements

The best way to provide the proper air temperature is to provide a separate thermostatic control to compensate for the heat dissipated by the PS 390 and any other equipment and personnel in the area. The air conditioning system must provide sufficient heating and cooling to maintain the environment within the limits specified in Table 1-4.

Table 1-4. Temperature and Humidity Ranges

	OPERATING OPERATING	NON-OPERATING
Temperature	50°F to 104°F 10°C to 40°C	-40°F to 122°F -40°C to 50°C
Humidity	20% to 80% Noncondensing	1% to 90% Noncondensing

Heat dissipation factors can be calculated by using Table 1-5. These figures should be added to any other heat generated by equipment and personnel located in the same room.

Table 1-5. Heat Dissipation Ranges

PS 300 SYSTEM COMPONENT	HEAT DISSIPATED
Control Unit	4710 BTU/hr
Color Raster Display	512 BTU/hr
Peripheral Multiplexer	512 BTU/hr
One Person	400 BTU/hr

Air Quality

The Evans & Sutherland computer graphics equipment is designed to operate in an office-type environment, where air filtration is not always possible. However, the E&S control unit should be placed away from high traffic areas as the build-up of potential contaminates is more concentrated in these areas. Airborne dust, dirt particles, and smoke can clog intake air filters and cause damage to the floppy disk drive.

Dust is usually controlled by normal heating, ventilating, and cooling equipment if adequate filters are used. Keep the system area clean and orderly to lessen the concentration of airborne particles and help maintain system reliability. Where excess dust or airborne particles are present, install an electrostatic filter to prevent damage to the system.

CAUTION

Never place the PS 390 system in an area containing even small concentrates of corrosive chemicals.

FACILITIES PREPARATION AND OPERATING CONSIDERATIONS

The following sections provide information on fire and safety precautions, the work table, floor coverings, cabling, and use of partitions. Information on operating considerations such as acoustics, lighting, vibration, static electricity and electrostatic discharge (ESD), electromagnetic interference (EMI), corrosive elements, and altitude is also provided.

Fire and Safety Precautions

Existing building fire and safety codes should be adequate for the PS 390 installation. However, local experts should be consulted about fire prevention and extinguishing devices.

Do not install the PS 390 near the use, storage, or manufacturing of flammable or explosive material.

For safety as well as operational reasons each interconnected piece of equipment must be provided with a properly grounded outlet.

All power circuits must be adequately protected with fuses or circuit breakers of a suitable size.

No metal should be exposed on the walking surface of floors.

Work Table

The PS 390 displays and interactive devices should be installed on a table or large desk of heavy construction with a durable, nonglare surface. The display and interactive devices require approximately 4 square feet of space. The work surface should be a comfortable height for an operator. The suggested height is 28 inches.

Floor Coverings

The most desirable flooring is a raised floor that includes tile-covered panels supported by a grid system of pedestals. These floors simplify installation and provide flexibility for subsequent layout changes or expansion. They also provide an area through which cables connecting various components of the system can be routed and kept out of the way.

If you are unable to use a raised a floor, most floor surfaces are adequate for the installation of the PS 390, with the following considerations:

- Carpeting - Any high-grade industrial carpeting, with short, closed-loop piles. Use minimal or no padding. The carpet should have good antistatic properties and/or a low surface resistivity.

CAUTION

Shag rug, deep pile and other such carpets are not recommended and can cause serious operational difficulties. These rugs have loose fibers and collect dust particles which can damage the floppy disk drive, clog cooling inlet filters, and generate unacceptable levels of static electricity.

- Tile – Most tiles provide a suitable surface, however, specific attention should be given to underlay. There is a tendency for some tiles to build up static charge. This can be minimized by proper application of low-resistivity sealer and polish. This application will need to be repeated at appropriate intervals.
- Wax is not recommended as a protective coating for floors in a computer area as it tends to build up surface resistivity and increase static charge.
- Other surfaces should be evaluated for surface resistivity, ease of cleaning and resistance to decomposition, durability, cost, and appearance.

Cabling

Conduits, cable ramps, and any necessary alterations must be implemented prior to the system delivery. Cables that need to be routed include the cabling from the host system to the PS 390 and cable from the PS 390 control unit to the display. Any customer supplied cables must be shielded.

Partitions

Floor-to-ceiling partitions are an effective way of controlling noise and dust. Partitions must be positioned to avoid blocking airflow to the equipment and to allow for equipment access and cabling restraints.

Acoustics

The E&S graphics system is designed to operate with a minimum amount of noise. Cooling fans within the cabinets are a possible source of audible sound, but in most environments ambient sound will be louder than the PS 390.

If several PS 390s are to be operated in close proximity, acoustical damping of the ceiling, floors, and walls might be considered.

Lighting

The PS 390 is designed to operate in a normal lighting environment. The optimum lighting for a graphics CRT display should be subdued, indirect incandescent lighting. To reduce operator fatigue, avoid lighting that produces glare on the face of the CRT.

Vibration

Vibration can cause slow degradation of mechanical parts and contacts. It should be avoided whenever possible. In cases where structure-borne vibration is negligible, no problems should arise. If there is any anticipation of unusual or prolonged vibration, consult an E&S Technical Support representative.

Static Electricity and Electrostatic Discharge (ESD)

Do not locate the PS 390 system in an area where potentially large charges of static electricity may gather. For information on floor conductivity, see IEEE Standard 142-1972. Although the PS 390 system has been engineered to resist the harmful effects of ESD, every effort should be made to reduce the possibility of ESD directly to the equipment.

Static electricity is the result of physical action. Vibration, friction, and separation of materials are common static generators. People and furniture are the most common static storage collectors. Static may be generated by walking, rising from chairs, moving objects, or pushing vehicles with nonconductive wheels. Voltages of 16KV have been measured on plastic-covered metal desk chairs as a result of a person standing up. This often occurs at low relative humidities (0 to 20%).

Electromagnetic Interference (EMI)

The PS 390 product line has been tested and found to meet the Federal Communications Commission radiation limits for a Class A computing device pursuant to Subpart J of Part 15 of the FCC rules.

EMI sources close to computer systems can affect their operation. It is difficult to predict whether or not problems will arise at a particular site. Some common sources of EMI that have been known to cause failures are:

Thunderstorms	Broadcast stations	Fluorescent lights
Radar	Mobile communications	Static electricity
High voltage power lines	Power tools	Ultrasonic cleaners
Appliances	Relay contactors	Dielectric heaters
Office machines	Vehicle ignitions	Arc welders
Industrial machines	Magnetic devices	

Consult an E&S Technical Support representative if potential problems exist at a particular site.

Corrosive Environments

Operation of the PS 390 in corrosive environments results in damage to electronic components and circuitry. Some common corrosive substances are:

Sodium chloride (salt)	Nitrogen oxides
Hydrogen sulfide	Nitrates
Sulfur dioxide	Ammonia
Hydrocarbons	Ozone

Consult an E&S Technical Support representative if any of these contaminants are present in the intended environment.

Altitude

System operation at high altitudes may be affected by low air density. Heat dissipation problems may occur at altitudes greater than 7000 feet (2000 meters). If high altitude operation is anticipated, additional air flow around the control unit should be provided.

INTERFACE INSTALLATION MANUALS

You must prepare the site for the interface(s) that serves as the communication link between your host system and the PS 390. Requirements for interface(s) installation must be met before you request hardware installation of the PS 390. A Customer Installation and User Manual for the interface(s) you selected was shipped to you in the system software package. Carefully read the manual to prepare your site for the installation of the interface(s).

2. INSTALLATION, PERFORMANCE VERIFICATION, AND WARRANTY

This chapter briefly describes the installation process that is finalized by completing the Performance Verification Form. Completion of this form initiates the 60-day warranty provided for Evans & Sutherland products.

INSTALLATION

After unpacking the system, the E&S Customer Engineer installs the hardware components of the system. It is not necessary for a customer representative to be present during hardware installation. However, a customer representative must be present during the performance verification testing.

PERFORMANCE VERIFICATION TESTING

When the hardware installation is complete, the E&S Customer Engineer runs the standard Performance Verification Test (PVT) for the PS 390 Graphics System, and installation tests for the interface and any option. These tests must be run in the presence of an authorized customer representative. In addition to demonstrating the performance of the system according to published specifications, the tests also exemplify proper programming with PS 300 commands and function networks.

The **Customer Guide to the PS 300 System PVT** and the **Customer Guide to the PS 390 Rendering PVT** contain descriptions of the features and operating instructions for the PS 300 and PS 390 PVTs.

The following is a list of PVTs that are run:

- PS 300 System PVT
- Interface Performance Verification Test
- PS 390 Rendering PVT (if applicable)
- Raster Option Performance Verification Test (if applicable)

The PVTs will make use of the following peripherals, if present at your site:

- Data Tablet
- Control Dials
- Function Buttons
- Keyboard including Function Keys
- Mouse

Completion of the Performance Verification Form

NOTE

The 60-day warranty period on the product will not be provided until the Performance Verification Form is completed.

At the conclusion of all performance verification testing, you and the E&S Customer Engineer will complete the Performance Verification Form. This form acknowledges that the E&S product has been installed and is performing according to published specifications. Both you and the customer engineer must sign and date the bottom of the form. The testing procedures and the completion of the form initiate the 60-day warranty period that is supplied with E&S products.

Any performance deficiencies should be described on the Performance Verification Form. E&S is responsible for making sure that deficiencies are corrected and that the product is brought up to the proper level of performance during the warranty period. If a product or device must be replaced during the warranty period, a separate warranty extension will be provided for that product or device to ensure that it has full 60-day warranty coverage.

For example, a deficiency may be a keyboard whose LEDs do not display characters during the performance testing, a color display that is not properly aligned, or a control dial that will not turn properly. The Performance Verification Form should be completed for systems with noted deficiencies. Deficiencies do not define a system as unusable.

An unusable system is defined as a system where the critical failure of a device or component incapacitates the system in such a way that it is totally unusable for your purposes. If, because of a component failure, a system is declared unusable by the customer engineer during the testing phase, the Performance Verification Form should not be completed until the failure is corrected and the system usable.

For example, a system would be declared unusable if the only host-to-PS 390 interface fails to perform. A system would also be declared unusable if the color display fails to generate any images.

Your system installation is not officially completed until a usable system has been installed at your site. There may be some cases where shipment of parts to repair failures cause a short delay.

Warranty Deferral

If a usable system is performing to published specifications and you choose not to complete the Performance Verification Form, you will be asked to sign a warranty deferral that releases Evans & Sutherland from any financial obligations to insure or support the E&S product on your site.

You will be asked not to use the equipment and to place it in a secured area. The equipment will remain at your site unless otherwise specified. You will be liable for any damage to the system or system components that occurs during the warranty deferral period. Should E&S be requested to perform any service on the equipment, you will be charged according to the current Requested Maintenance Service rates.

PS 390 GRAPHICS SYSTEM WARRANTY

This warranty provides your new system or device with 60-days of full service, as provided by a standard E&S Continuous Maintenance Service contract. This is the standard maintenance service offered to the customers of E&S graphics products. The service is described in the following chapter.

Service and support of the PS 390 during the warranty, and under a Continuous Maintenance Service contract, is supplied by a team of highly qualified and extensively trained specialists and engineers within the E&S Customer Engineering Department.

Your first line of support is through the local Customer Engineer assigned to your system site and by the Customer Service toll-free number in Salt Lake City.

The local Customer Engineer is supported by District and Regional technical specialists and managers. These field personnel are supported by the Technical Support and Software Support Groups in Salt Lake.

3. PS 390 MAINTENANCE SERVICE PLANS, OPTION REQUESTS, AND OTHER SERVICES

Evans & Sutherland Customer Engineering provides complete hardware and software support of all E&S products. Nationwide coverage of customer sites is currently provided out of 16 field service locations. Service in Europe is provided by Evans & Sutherland GMBH, operating out of two locations. Field service operations and customer sites receive back-up support from the software and technical support groups based in Salt Lake City.

In the United States, requests for hardware and software service are handled through the E&S Customer Service Center which provides you with a call-back by an E&S customer engineer or software analyst within one hour of the request. In addition to providing maintenance service for hardware and software, Evans & Sutherland offers training classes for programmers and maintenance training courses.

Evans & Sutherland offers two standard maintenance service plans, OEM support, and will contract to provide on-site customer service. Evans & Sutherland can also negotiate special service contracts for maintenance programs tailored to fit individual needs.

The following sections detail these services. For more information, contact the Evans & Sutherland Customer Engineering Department.

SERVICE PLANS

Evans & Sutherland offers two maintenance service plans, Continuous Maintenance Service and Requested Maintenance Service.

Continuous Maintenance Service is designed to supply the customer with complete and continuing maintenance of all hardware, software, firmware, and documentation supplied by Evans & Sutherland. Requested Maintenance Service is supplied only at the customer's request. The following chart compares the two plans. The chart shows the type of service and the charges to the customer, as well as customer responsibilities, for each service.

SERVICE	CONTINUOUS MAINTENANCE (Standard, contracted on-call service)	REQUEST MAINTENANCE (Non-contract, time & materials service)
CORRECTIVE MAINTENANCE	All travel, labor, and parts costs covered under the contract.	Customer billed at the in-effect Requested Maintenance Service rates for travel, labor, and parts. Exchange prices on parts range from 40% to 100% of the spares catalog list price.
	24-hour elapsed response guaranteed Customer request for service to Customer Service Center provides the customer with a return call by a customer engineer within one hour.	No guaranteed response time. Lowest call priority.
PREVENTATIVE MAINTENANCE	A preventative maintenance schedule is set up for individual customers as a function of their operating needs and environment. Minimum 3 visits per year.	Available on request. Billed at the in-effect Requested Service rates. Typical visit $1000-$1500 plus needed parts.
SOFTWARE SUPPORT	A Customer Service Hotline is provided, as well as on-site support (as needed) at no charge.	Available on request. Billed at the in-effect Requested Service rates.
NEW FIRMWARE AND SOFTWARE	Supplied automatically to all contract holders at no charge.	Available for purchase at catalog prices.
INSTALLATION OF PURCHASED OPTIONS	When scheduled by E&S, no charge for installation of add-on options to contract holders.	Billed at the in-effect system reconfiguration fee.

SERVICE	CONTINUOUS MAINTENANCE (Standard, contracted on-call service)	REQUEST MAINTENANCE (Non-contract, time & materials service)
FIELD CHANGE ORDERS (FCOs) INSTALLATION	FCOs that are necessary to correct performance defects and/or to maintain the equipment at a serviceable level are automatically installed at no charge. The price for installing FCOs that modify the system to support new add-on options is quoted along with the add-on option price.	Available for purchase. Customers are encouraged to purchase all FCOs required to maintain the system at a serviceable level in order to minimize repair costs.
CONFIGURATION CONTROL	Complete hardware, software, and firmware configuration data is maintained in the C.E. Department data base for all systems under contract.	Customer must maintain own configuration data. Failure to do so could result in in additional repair costs and charges. Reconfiguration charge may be necessary before servicing equipment.
PRICES	Guaranteed for 12-month contract periods. Prices will be changed on the anniversary date only if the customer has had 90 days prior notice.	The in-effect Requested Service rates are subject to change without notice.
PAYMENT	Monthly rate is predetermined by hardware, firmware, and software configuration.	Customer must issue a purchase order before service will be dispatched. To reduce response time, a preissued purchase order is suggested.
RESPONSIBILITY	Evans & Sutherland assumes responsibility for the maintenance and support of systems under contract.	Customer takes full responsibility for the maintenance and support of all systems.

MAINTENANCE SUPPORT FOR OEMs

Various services and support are available for OEM customers. These include maintenance training, card and module repair, first level on-site support by E&S customer engineers, maintenance plan design, and an OEM Field Service Support Plan. In the last plan, second and third level support is provided by the technical support and software support groups of the E&S Customer Engineering Department.

OTHER MAINTENANCE SERVICE

In addition to standard on-call and time-and-material contracts, E&S designs custom maintenance service plans to meet the needs of its customers. A typical maintenance service designed for a high volume Continuous Maintenance customer may guarantee a 30 minute average response time, 60 minute mean time to repair, and a 99.5% system availability over a 96 hour per week service period.

OPTION REQUESTS

Options can be ordered for your PS 390 at any time. Options include additional peripherals, interfaces, memory boards and an Energy Coprocessor Card. You should request sales literature from your account executive for further descriptions of all E&S products. Options must be ordered through your local Evans & Sutherland account executive.

The current configuration of your system must be available to determine if your system can support the option. If you have been under a Continuous Maintenance Service contract, we will have your current system configuration or we will send a customer engineer to your site to verify the configuration at no charge.

If you are not under a Continuous Maintenance Service contract, you must either supply us with a current system configuration, or you will be charged for the on-site visit to determine the configuration of your system.

Request for Bid

When you order an option for your system, a "Request for Bid" form will be filled out by the account executive. This bid must be submitted to Evans & Sutherland Customer Engineering. They will determine any charges that will be billed to you, in addition to the price of the option, and any applicable installation fee.

Charges are based on your current system configuration and the option you are requesting. Your system may require modifications to existing components to support the new option. If you are under a Continuous Maintenance Service contract, you will only be charged for these modifications if they are required to support the option.

If you are not under contract, you will be billed for all expenses. You will be notified of the charge before a sales order is generated for your option. The account executive will not complete the sale of the option until you have agreed to the bid.

Installation Charges for Options

If you are under Continuous Maintenance, installations of new options are provided free of charge when the installation of the option is scheduled by Evans & Sutherland. If you are under Continuous Maintenance and your require that the option be installed during a specific timeframe, you will be charged for the installation of the option.

If you are not under a Continuous Maintenance contract, you will be charged for all expenses accrued during the installation of the option.

SOFTWARE AND DOCUMENTATION SUPPORT

Customer Service Number
1-800-582-4375

Software Support

Software support is provided to customers by the Customer Engineering Software Support Group at Evans & Sutherland corporate headquarters in Salt Lake City, Utah. During the hours 7:00 a.m. to 6:00 p.m. Mountain Standard Time, customer software problems will be logged into a problem-tracking system to ensure that all software calls receive the fastest possible resolution.

Once you have logged your problem through the customer service number, a Software Support Analyst will call you back within one hour to get a detailed description of your problem. Within 48 hours, you will receive by telephone either a solution for your problem or a status report.

There is no charge for this service, provided the following conditions are met:

- You have a Continuous Maintenance contract or your system is being installed or is still under warranty.
- You are having a problem with an Evans & Sutherland-supported product which fails to perform as specified.

Customers without a Continuous Maintenance contract who request special help with unsupported software (and are not covered under installation or warranty) will be billed for the service at prevailing Customer Engineering hourly rates. If you are to be billed, your consent will be obtained before the problem is investigated.

The customer service number is intended only for logging problems; it should not be busy for extended periods. However, if the number is continually busy or nonoperational, the formal problem logging service can also be reached by calling (801) 582-5847 and asking for Customer Engineering Dispatch. Before 7:00 a.m. and after 6:00 p.m. (Mountain Time), a call recorder will be operational on the customer service number. If you leave your name, phone number, and type of system (for example, PS 390) an analyst will call you before 10 a.m. MST on the next work day.

Before you call, please check the documentation to be sure your question cannot be answered there. Also, please have the following information at hand when you call.

- Your customer site number and the system ID number. These numbers are listed on labels attached to your PS 390 display and control unit.
- PS 390 graphics firmware version number. This is the E&S part number that appears on the distribution media of the PS 390 Graphics Firmware Package (for example, 904140-000 A2.V02).
- The host computer model, and operating system and its version number under which you are encountering difficulties (for example, DEC VAX 11/780, VMS V3.3).
- Complete error numbers and messages which were output.
- If possible, the commands issued that caused the problem in question.

Documentation Support

Additional support is provided to customers by the Interactive Systems Publications Group at corporate headquarters in Salt Lake City, Utah. During the hours of 8:30 a.m. to 4:30 p.m. Mountain Standard Time, technical writers will be available for questions or comments regarding documentation. Your corrections and/or suggestions are encouraged regarding existing documentation or needed documentation.

This service is available free of charge to anyone using E&S equipment and its related documentation. No other requirements (such as a Maintenance Contract) are required.

Evans & Sutherland documentation must be ordered through your E&S account executive. The **PS 300 Document Set** is orderable as a complete set, by volume, and by section. Other E&S documentation is orderable by volume only.

TRAINING PROGRAM

Evans & Sutherland offers a comprehensive training course for the PS 390 programmer. The class is designed to train users involved in writing application software for the PS 390. It is recommended that students already have a basic understanding of computer graphics, computer programming, and the basic operating system and editing functions of the host computer that will be used. Upon completion, students should have the knowledge and experience to use the PS 390 in most computer graphics applications.

The PS 390 Programmer Training Class is given at the E&S corporate offices in Salt Lake City, Utah, or arranged classes can be taught at customer sites. Class instructors are experienced E&S product specialists and application engineers.

A limited class capacity of no more than six people assures that students are given specialized, individual attention during classroom instruction, as well as hands-on experience at the PS 390.

Training materials are included in the cost of the course. Contact your E&S account executive about current costs and scheduling.

4. OPERATING CONSIDERATIONS AND TROUBLESHOOTING

This chapter provides brief operation considerations and troubleshooting tips.

OPERATING CONSIDERATIONS

Powering the System Up and Down

Frequent powering up and down of a computer system is detrimental to system long-term reliability. Leaving a system powered up in a safe environment greatly enhances equipment reliability and serviceability.

It is recommended that the PS 390 be left powered up during the work day. If adequate safety and environmental provisions are taken, the PS 390 can be left powered on indefinitely. To provide a safe and reliable atmosphere for the graphics system, the air-conditioning equipment and/or other computer-supportive equipment must be well monitored. The only precaution recommended, if the PS 390 is to remain powered up, is for the operator to either turn the PS 390 display intensity down or turn the display off at the end of each session. This will prevent "burn-in" of any pattern present; and also protect the CRT phosphor in the event of a hardware malfunction.

The main power switch on the logic box is used to supply power to the logic cabinet. The peripheral multiplexer supplies power to the peripherals and has its own power on-off switch. The display also has its own power on-off switch.

TROUBLESHOOTING

The following chart provides a brief troubleshooting guide that can be used as an aid in system operation. This chart covers only those operating considerations that can be checked and remedied by you. There are no user-replaceable components or fuses inside any of the PS 390 cabinets. If you are unable to operate your system after using this guide, please call E&S Customer Service Center, 1-800-582-4375.

SYMPTOM	REMEDY
The system will not power on.	Check the power cords, A/C input circuits (wall plugs), and circuit breakers.
The system will not boot.	Make sure the system power is on. Check to make sure the correct firmware is installed in the drives correctly. Make sure the latches on the drive doors are closed.
Nothing is displayed on the screen when the system is booted.	Make sure the display is on. Make sure the intensity is up. Check the power cords to the display and the cabling between the control unit and the display.
An interactive device fails to operate.	Make sure the device cable is connected to the device and to the proper port on the front of the peripheral multiplexer. Make sure the peripheral multiplexer power switch is turned on.
The keyboard fails to respond once the system has booted.	Make sure you are in the proper keyboard mode of operation. Check the cabling between keyboard and peripheral multiplexer.
The system fails to respond to the host system.	Make sure that your interface is functional and that you are in the proper keyboard mode of operation. Make sure you have established the connection between the PS 390 system and the host system properly. (Refer to your interface installation manual.)

E&S CUSTOMER SERVICE TELEPHONE INFORMATION LIST

Evans & Sutherland Customer Engineering provides a central service numbered staffed by CE representatives who are available to take requests from 9:00 a.m. Eastern Time to 5:00 p.m. Pacific Time (7:00 a.m. to 6:00 p.m. Mountain Time). All calls concerning customer service should be made to one of the following numbers during these hours. Before you call, please have available your customer site number and system tag number. These numbers are on the label attached to your PS 300 display or control unit.

Customers in the continental United States should call toll-free:

1 + 800 + 582-4375

Customers within Utah or outside the continental United States should call Dispatch at:

(801) 582-9412

If problems arise during product installation or you have a question that has not been answered adequately by the customer engineer or the customer service center, contact the regional manager at one of the following Customer Engineering offices:

Eastern Regional Manager
(for Eastern and Central Time Zones)
(518) 885-4639

Western Regional Manager
(for Mountain and Pacific Time Zones)
(916) 448-0355

If the regional office is unable to resolve the problem, you may want to call the appropriate department manager at corporate headquarters:

National Field Operations
(for field service issues)
(801) 582-5847, ext 4843

Software Support
(for sofware issues)
(801) 582-5847, ext 4810

Technical Support
(for hardware issues)
(801) 582-5847, ext 4868

Director of Customer Engineering
(for any unresolved problem)
(801) 582-5847, ext 4840

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Your comments will help us provide you with more accurate, complete, and useful documentation. After making your comments in the space below, cut and fold this form as indicated, and tape to secure (please do not staple). This form may be mailed free within the United States. Thank you for your help.

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